

## SIPMOS® Small-Signal-Transistor

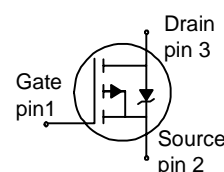
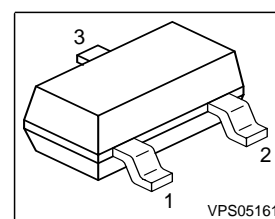
### Feature

- P-Channel
- Enhancement mode
- Logic Level
- Avalanche rated
- $dv/dt$  rated

### Product Summary

$V_{DS}$	-60	V
$R_{DS(on)}$	8	$\Omega$
$I_D$	-0.17	A

SOT-23



Type	Package	Ordering Code	Marking
BSS 84 P	SOT-23	Q67041-S1417	YBs

### Maximum Ratings, at $T_A = 25\text{ °C}$ , unless otherwise specified

Parameter	Symbol	Value	Unit
Continuous drain current	$I_D$		A
$T_A=25\text{ °C}$		-0.17	
$T_A=70\text{ °C}$		-0.14	
Pulsed drain current	$I_{D\text{ puls}}$	-0.68	
$T_A=25\text{ °C}$			
Avalanche energy, single pulse	$E_{AS}$	2.6	mJ
$I_D=-0.17\text{ A}$ , $V_{DD}=-25\text{ V}$ , $R_{GS}=25\Omega$			
Avalanche energy, periodic limited by $T_{jmax}$	$E_{AR}$	0.036	
Reverse diode $dv/dt$	$dv/dt$	-6	kV/ $\mu\text{s}$
$I_S=-0.17\text{ A}$ , $V_{DS}=-48\text{ V}$ , $di/dt=-200\text{ A}/\mu\text{s}$ , $T_{jmax}=150\text{ °C}$			
Gate source voltage	$V_{GS}$	$\pm 20$	V
Power dissipation	$P_{tot}$	0.36	W
$T_A=25\text{ °C}$			
Operating and storage temperature	$T_j, T_{stg}$	-55... +150	$\text{°C}$
IEC climatic category; DIN IEC 68-1		55/150/56	

**Thermal Characteristics**

Parameter	Symbol	Values			Unit
		min.	typ.	max.	
<b>Characteristics</b>					
Thermal resistance, junction - soldering point (Pin 3)	$R_{thJS}$	-	-	200	K/W
SMD version, device on PCB: @ min. footprint	$R_{thJA}$	-	-	350	
@ 6 cm <sup>2</sup> cooling area <sup>1)</sup>		-	-	300	

**Electrical Characteristics, at  $T_A = 25\text{ °C}$ , unless otherwise specified**

Parameter	Symbol	Values			Unit
		min.	typ.	max.	
<b>Static Characteristics</b>					
Drain-source breakdown voltage $V_{GS}=0, I_D=-250\mu A$	$V_{(BR)DSS}$	-60	-	-	V
Gate threshold voltage, $V_{GS} = V_{DS}$ $I_D=-20\mu A$	$V_{GS(th)}$	-1	-1.5	-2	
Zero gate voltage drain current $V_{DS}=-60V, V_{GS}=0, T_A=25\text{ °C}$ $V_{DS}=-60V, V_{GS}=0, T_A=125\text{ °C}$	$I_{DSS}$	-	-0.1	-1	$\mu A$
Gate-source leakage current $V_{GS}=-20V, V_{DS}=0$	$I_{GSS}$	-	-10	-100	
Drain-source on-state resistance $V_{GS}=-4.5V, I_D=-0.14A$	$R_{DS(on)}$	-	8	12	$\Omega$
Drain-source on-state resistance $V_{GS}=-10V, I_D=-0.17A$	$R_{DS(on)}$	-	5.8	8	

<sup>1)</sup>Device on 40mm\*40mm\*1.5mm epoxy PCB FR4 with 6cm<sup>2</sup> (one layer, 70  $\mu m$  thick) copper area for drain connection. PCB is vertical without blown air.

Electrical Characteristics, at  $T_A = 25\text{ }^\circ\text{C}$ , unless otherwise specified

Parameter	Symbol	Conditions	Values			Unit
			min.	typ.	max.	

### Dynamic Characteristics

Transconductance	$g_{fs}$	$V_{DS} \leq 2 \cdot I_D \cdot R_{DS(on)max}$ , $I_D = -0.14\text{A}$	0.065	0.13	-	S
Input capacitance	$C_{iss}$	$V_{GS} = 0$ , $V_{DS} = -25\text{V}$ , $f = 1\text{MHz}$	-	15	19	pF
Output capacitance	$C_{oss}$		-	6	8	
Reverse transfer capacitance	$C_{rss}$		-	2	3	
Turn-on delay time	$t_{d(on)}$	$V_{DD} = -30\text{V}$ , $V_{GS} = -4.5\text{V}$ , $I_D = -0.14\text{A}$ , $R_G = 25\Omega$	-	6.7	10	ns
Rise time	$t_r$		-	16.2	24.3	
Turn-off delay time	$t_{d(off)}$		-	8.6	12.9	
Fall time	$t_f$		-	20.5	30.8	

### Gate Charge Characteristics

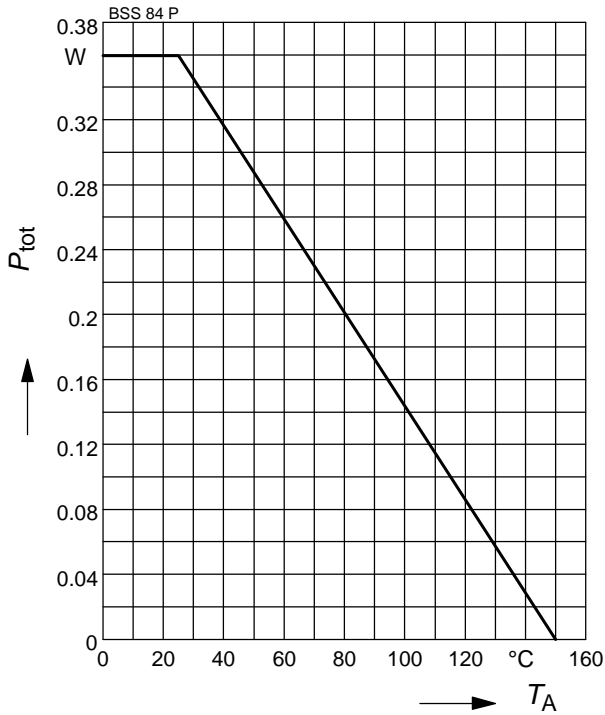
Gate to source charge	$Q_{gs}$	$V_{DD} = -48\text{V}$ , $I_D = -0.17\text{A}$	-	0.25	0.37	nC
Gate to drain charge	$Q_{gd}$		-	0.3	0.45	
Gate charge total	$Q_g$	$V_{DD} = -48\text{V}$ , $I_D = -0.17\text{A}$ , $V_{GS} = 0$ to $-10\text{V}$	-	1	1.5	
Gate plateau voltage	$V_{(plateau)}$	$V_{DD} = -48\text{V}$ , $I_D = -0.17\text{A}$	-	-3.42	-	V

### Reverse Diode

Inverse diode continuous forward current	$I_S$	$T_A = 25\text{ }^\circ\text{C}$	-	-	-0.17	A
Inv. diode direct current, pulsed	$I_{SM}$		-	-	-0.68	
Inverse diode forward voltage	$V_{SD}$	$V_{GS} = 0$ , $I_F = -0.17\text{A}$	-	-0.93	-1.24	V
Reverse recovery time	$t_{rr}$	$V_R = -30\text{V}$ , $I_F = I_S$ , $di_F/dt = 100\text{A}/\mu\text{s}$	-	23	34	ns
Reverse recovery charge	$Q_{rr}$		-	10	15	

### 1 Power dissipation

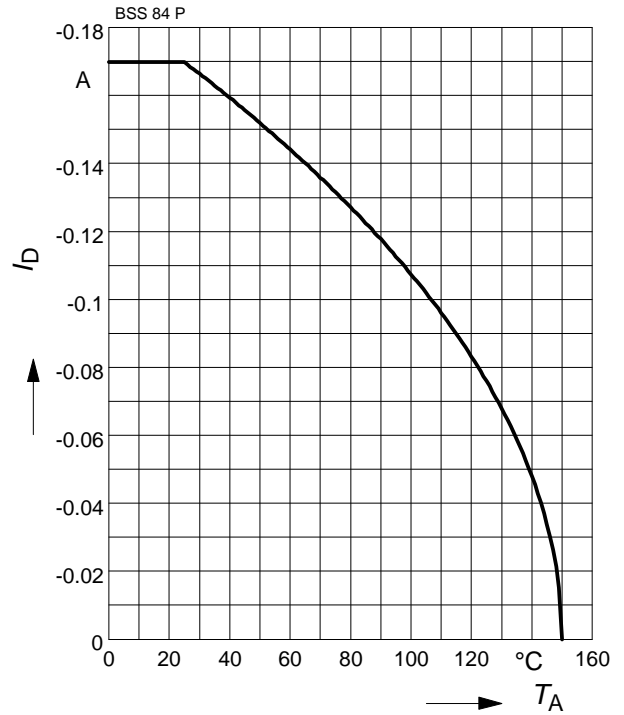
$$P_{\text{tot}} = f(T_A)$$



### 2 Drain current

$$I_D = f(T_A)$$

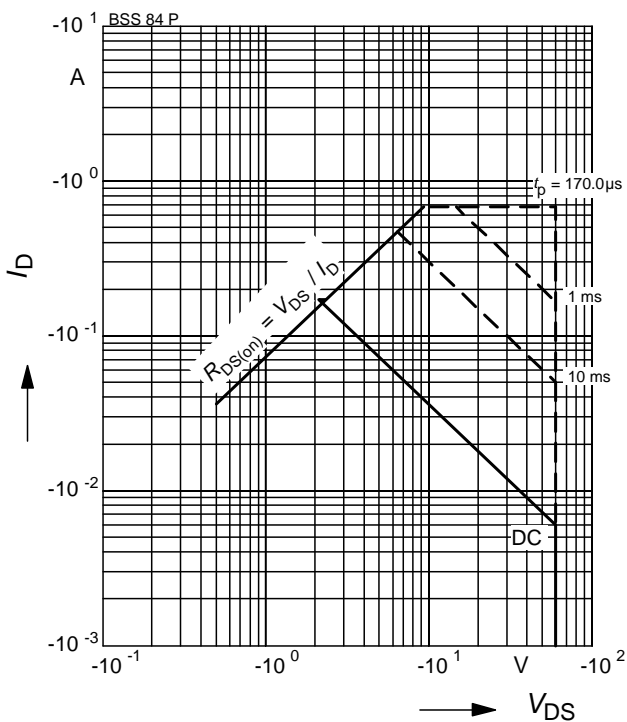
parameter:  $V_{GS} \geq 10 \text{ V}$



### 3 Safe operating area

$$I_D = f(V_{DS})$$

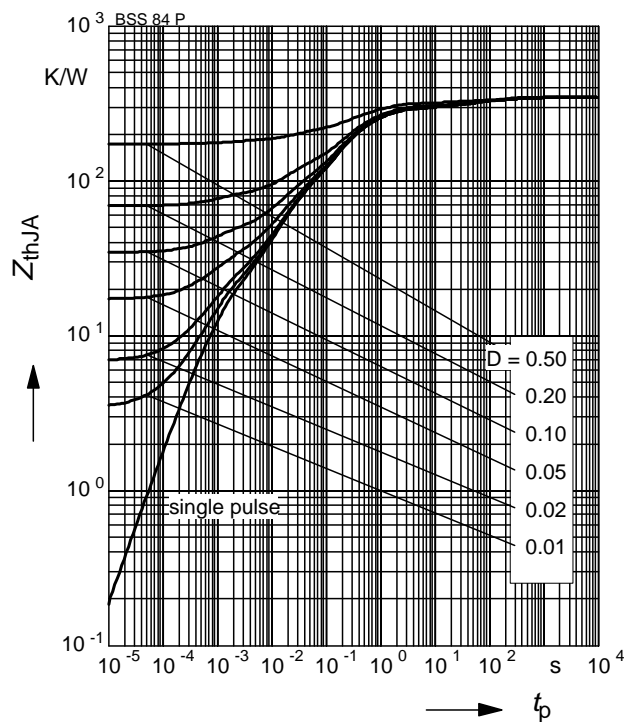
parameter:  $D = 0$ ,  $T_A = 25 \text{ °C}$



### 4 Transient thermal impedance

$$Z_{\text{thJA}} = f(t_p)$$

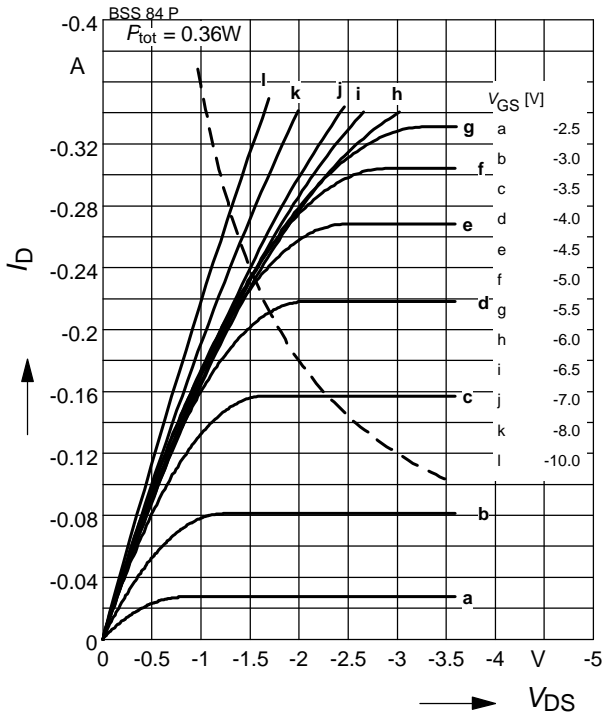
parameter:  $D = t_p/T$



**5 Typ. output characteristic**

$$I_D = f(V_{DS})$$

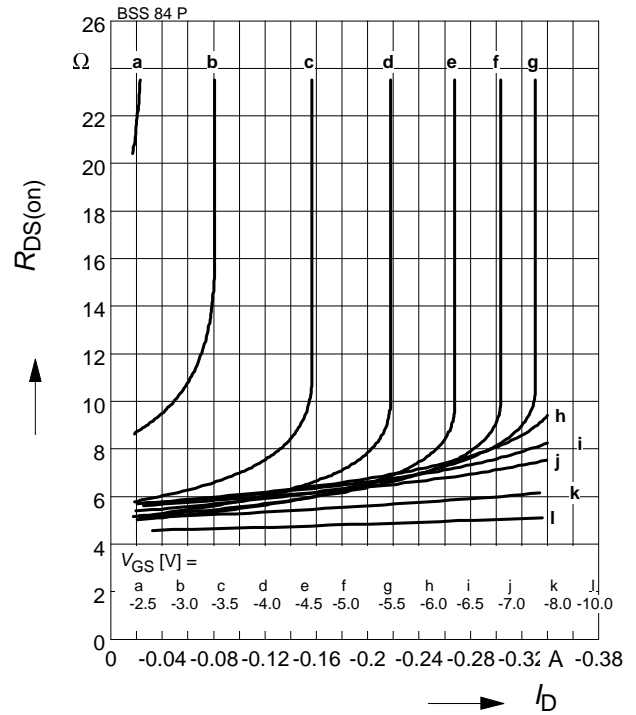
parameter:  $T_j = 25\text{ }^\circ\text{C}$



**6 Typ. drain-source on resistance**

$$R_{DS(on)} = f(I_D)$$

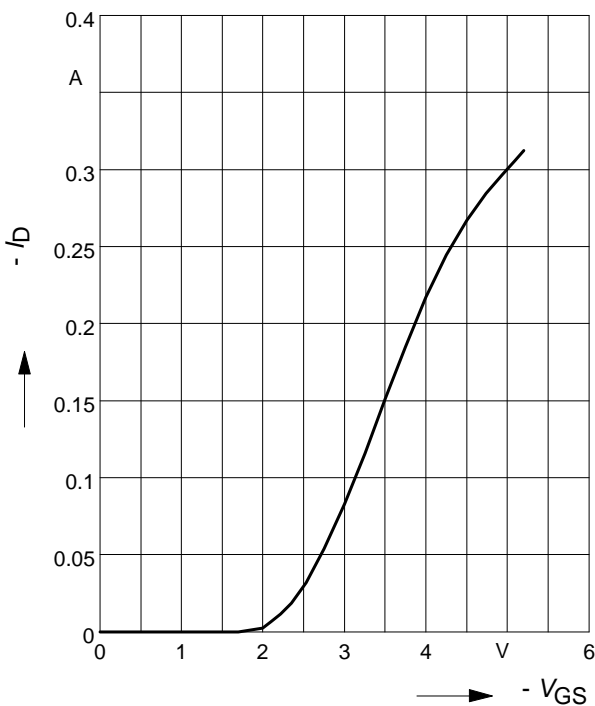
parameter:  $V_{GS}$ ;  $T_j = 25\text{ }^\circ\text{C}$



**7 Typ. transfer characteristics**

$$I_D = f(V_{GS}); |V_{DS}| \geq 2 \times |I_D| \times R_{DS(on)max}$$

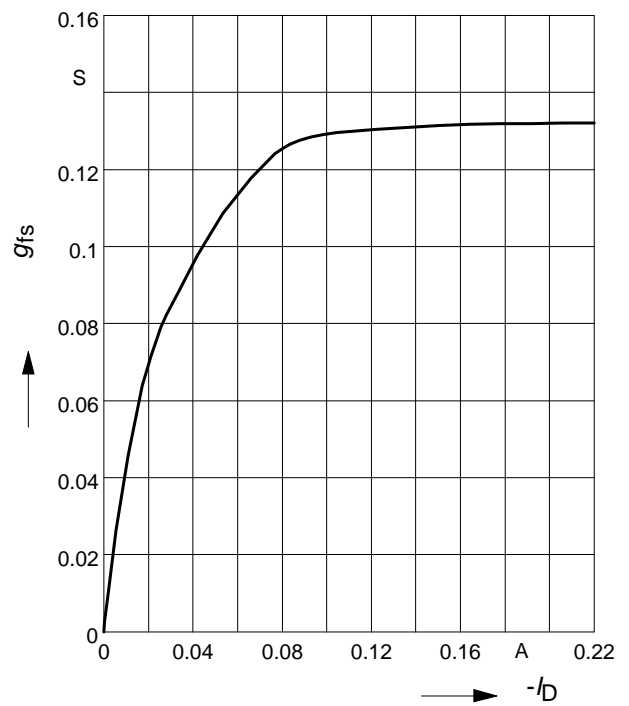
parameter:  $T_j = 25\text{ }^\circ\text{C}$



**8 Typ. forward transconductance**

$$g_{fs} = f(I_D)$$

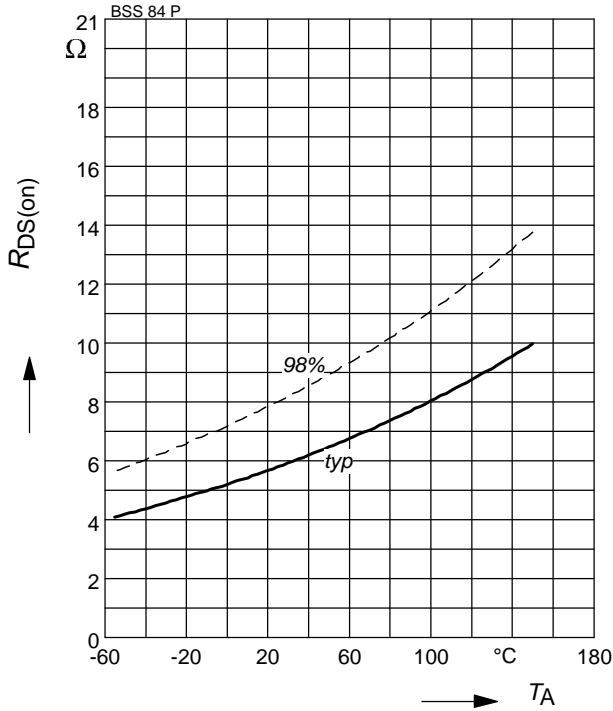
parameter:  $T_j = 25\text{ }^\circ\text{C}$



**9 Drain-source on-state resistance**

$$R_{DS(on)} = f(T_j)$$

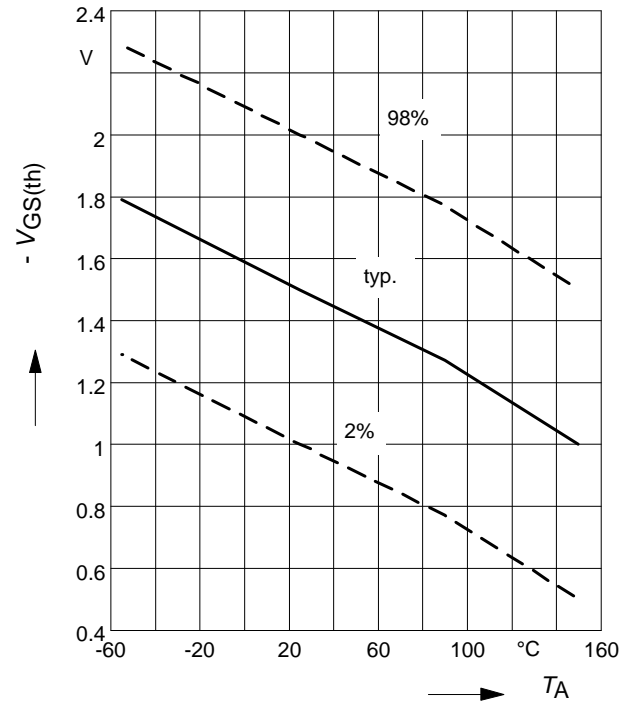
parameter:  $I_D = -0.17\text{ A}$ ,  $V_{GS} = -10\text{ V}$



**10 Typ. gate threshold voltage**

$$V_{GS(th)} = f(T_j)$$

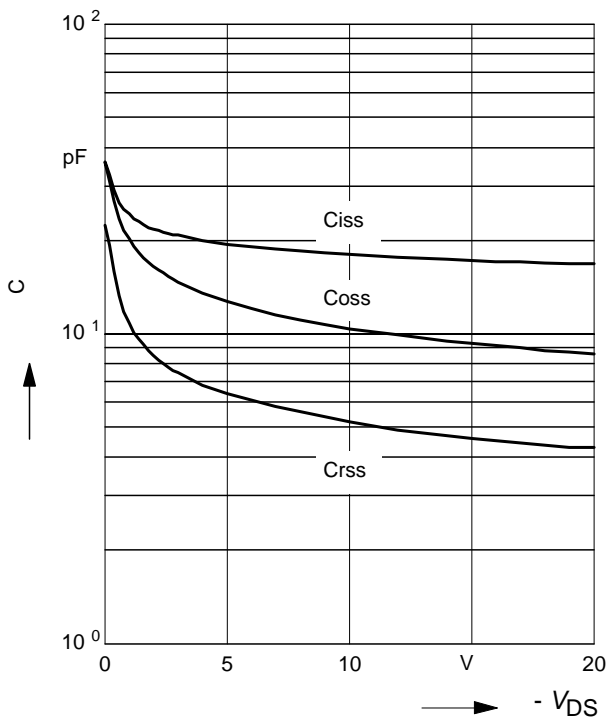
parameter:  $V_{GS} = V_{DS}$



**11 Typ. capacitances**

$$C = f(V_{DS})$$

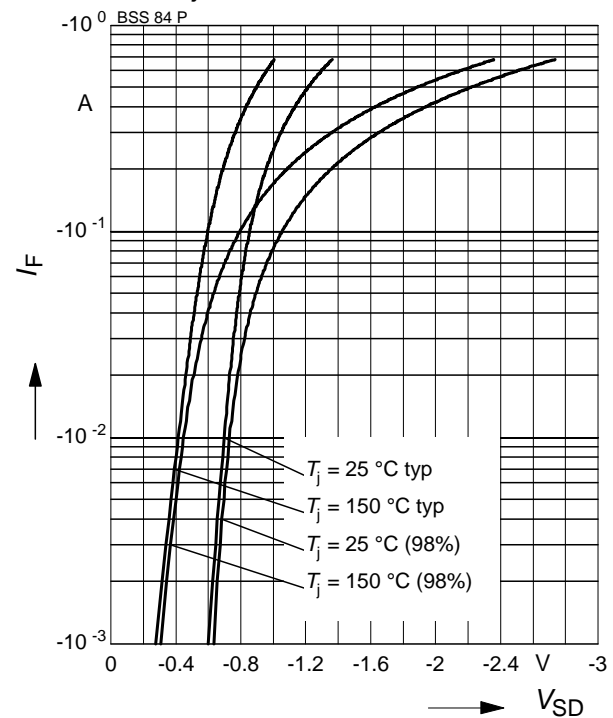
parameter:  $V_{GS}=0$ ,  $f=1\text{ MHz}$



**12 Forward character. of reverse diode**

$$I_F = f(V_{SD})$$

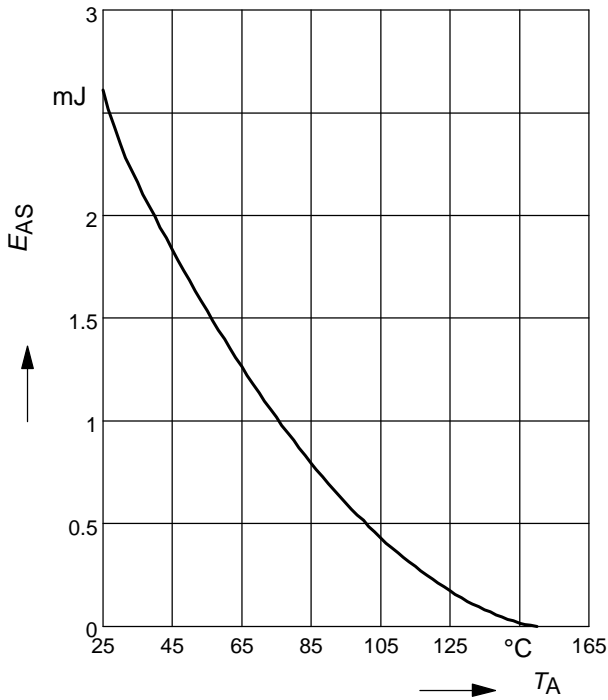
parameter:  $T_j$ ,  $t_p = 80\ \mu\text{s}$



**13 Typ. avalanche energy**

$E_{AS} = f(T_A)$ , parameter:

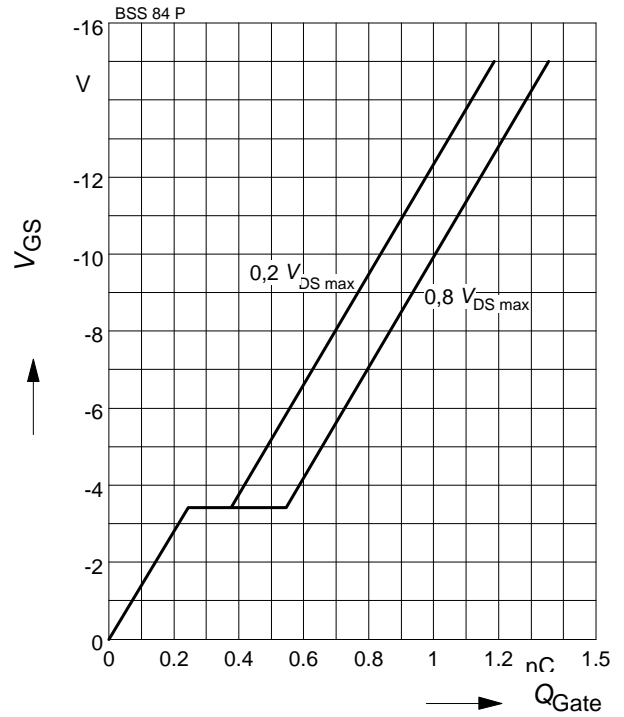
$I_D = -0.17 \text{ A}$  ,  $V_{DD} = -25 \text{ V}$ ,  $R_{GS} = 25 \text{ } \Omega$



**14 Typ. gate charge**

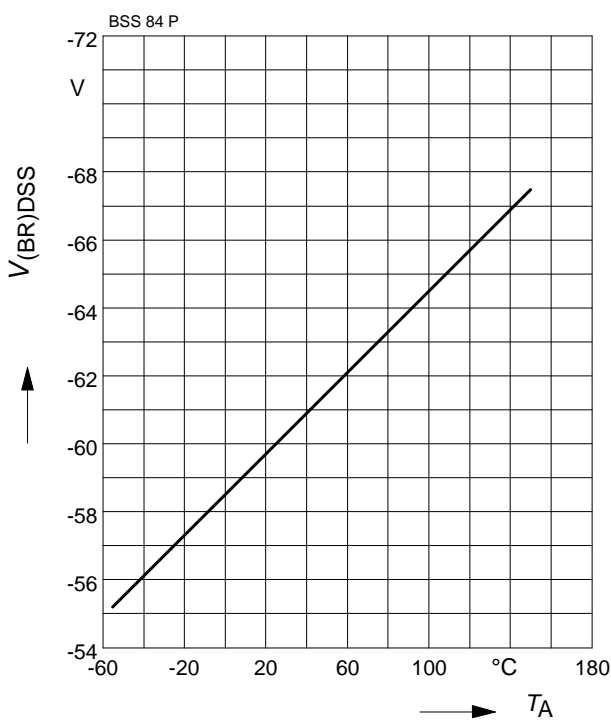
$V_{GS} = f(Q_{Gate})$

parameter:  $I_D = -0.17 \text{ A}$  pulsed;  $T_j = 25 \text{ } ^\circ\text{C}$



**15 Drain-source breakdown voltage**

$V_{(BR)DSS} = f(T_A)$



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